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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,094	09/09/2003	Takao Kamoshima	67161-098	9847

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Washington, DC 20005-3096

EXAMINER

NGUYEN, DILINH P

ART UNIT PAPER NUMBER

2814

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/657,094

Applicant(s)

KAMOSHIMA ET AL.

Examiner

DiLinh Nguyen

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-4 is/are allowed.
- 6) ☒ Claim(s) 1 and 5-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>9/24/04</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 5, the phrase "another element" in line 5 renders the claim indefinite because it is unclear how the second conductive layer electrical connects to another element. What is another element?

Regarding claim 5, the phrase "another element" in line 9 renders the claim indefinite because it is unclear how a dummy hole does not electrically connect the first conductive layer to another element. What is another element?

Regarding claim 6, the phrase "another element" in line 4 renders the claim indefinite because it is unclear how the second hole does not electrically connect the first conductive layer to another element. What is another element?

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 11 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

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described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 11, the phrase "said second hole used as the dummy hole is formed so as to reach the second interconnection portion with the small line width" is enabling one skilled in the art to which it pertains. Claim 11 is depending to claim 9, wherein claim 9 discloses that the second conductive layer (a third interconnection portion) is electrically connected to the second interconnection portion with the small line width. It is unclear how the dummy hole is formed so as to reach the second interconnection portion with the small line width?

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Saito et al. (U.S. Pat. 6908847).

Saito et al. disclose an interconnection structure, comprising:

a first conductive layer M1b, M1c formed on a substrate and composed of a copper layer (fig. 18, column 10, line 57 and column 11, line 18);

an insulating layer 24 formed on the first conductive layer and having a hole C2 reached the first conductive layer and a groove communicating with the hole;

a second conductive layer PM2b or M2 formed within the insulating layer and composed of a copper layer (column 15, line 31) electrically connected to the first conductive layer through the hole; and

a single barrier metal layer PM2a formed on an entire surface defining the hole and the groove in the insulating layer and formed between the second conductive layer PM2b or M2 and the hole C2, and the insulating layer 24; wherein

the barrier metal layer has an opening in a bottom portion of the hole, and the second conductive layer comes in direct contact with the first conductive layer through the opening (fig. 18).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (U.S. Pat. 6710448).

Wang disclose an interconnection structure, comprising:

a first conductive layer 104a and 102a formed on a substrate 100; and it would have been obvious to one having ordinary skill in the art to form the first conductive layer composed of a copper layer;

an insulating layer 106 formed on the first conductive layer and having a first hole and a second hole reaching the first conductive layer; and

a second conductive layer 110a for electrical connection (column 4, lines 10-22), electrically connected to the first conductive layer through the first hole and formed within the insulating layer; wherein

the second hole is used as a dummy hole which does not electrically connect the first conductive layer to any device [mechanical support structure 112] (cover fig., column 3, lines 56 et seq.).

- Regarding claims 6, Wang discloses that a dummy interconnection layer 112 which is electrically connected to the first conductive layer 102a through the second hole and does not electrically connect the first conductive layer to any device (cover fig.).
- Regarding claim 7, Wang discloses that a third conductive layer 108 filling the second hole, wherein the third conductive layer is not electrically connected to other interconnection layer other than the first conductive layer (cover fig.).
- Regarding claim 8, Wang disclose the first conductive layer 104 has a first interconnection with a large line width, and the second conduction layer 110 has a second interconnection portion with a small line width, and the first interconnection portion with the large line width is connected to the second interconnection portion with the small line width through the hole (cover fig.)
- Regarding claim 9, Wang discloses a semiconductor device (cover fig.) comprising: the first conductive layer has a first interconnection portion with a

large line width 102a, and a second interconnection portion with a small line width 104a, the second conductive layer 110 has a third interconnection portion with a small line width 110a, and the second interconnection portion 104a with the small line width is connected to the third interconnection portion 110a with the small line width through the hole (cover fig.).

- Regarding claim 10, Wang discloses that the second hole used as the dummy hole is formed so as to reach the first interconnection portion 102a with the large line width (cover fig.).
- Regarding claim 11, in so far as it is understood, Wang discloses a semiconductor device (cover fig.) comprising: the first conductive layer has a first interconnection portion with a large line width 102a, and a second interconnection portion with a small line width 104a, the second conductive layer 110 has a third interconnection portion with a small line width 110a, and it is considered obvious design choices to have the second hole used as the dummy hole is formed so as to reach the second interconnection portion with the small line width (cover fig.).

Claims Allowed

Claims 2-4 are allowed (see the examiner's statement of reasons for allowance in the previous office action).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN


HOAI PHAM
PRIMARY EXAMINER